

that subsist on domestic livestock in other parts of India form smaller packs (1-4 individuals) in contrast to the ones that subsist on wild prey (6-14 individuals). In Panna, interestingly, the wolves occur along with dhole in the same area. However, I sighted dholes only infrequently and only in less disturbed, denser parts of Panna. Thus, the preferred habitats of these two species seem to vary. Generally, it is believed that these

large, similar sized canids segregate their habitats due to interspecific competition. But in places like Panna, where the landscape is a mosaic of habitats providing niches for both the species, they are found to occur together.

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2. OCCURRENCE OF THE WOLF *CANIS LUPUS PALLIPES* LINN. IN SIDHI DISTRICT, MADHYA PRADESH

In *JBNHS* 93 (1): 81, I read an article by Shri A.M.K. Bharos mentioning the sighting of a solitary wolf in March, 1993 while travelling in Chhuhiyaghat on the border of Rewa and Sidhi districts.

I have also sighted a solitary wolf, which in all probability was a large male, on the outskirts of the Dhubri Sanctuary situated in the western part of Sidhi district in Madhya Pradesh,

in February, 1981.

I have also seen a female wolf, in rather poor condition, on the road to Chiklod in Raisen district of Madhya Pradesh, in the monsoon of 1982.

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3. THE ROLE OF ADMINISTRATION IN EXTERMINATION: FRESH EVIDENCE ON THE CHEETAH (*ACINONYX JUBATUS*) IN INDIA

The chronology and sequence of the extermination of the Asiatic cheetah provided in the only full length work on the subject relies on books and journal records. However, as the author admits it is often not possible 'to ascribe a definite date' as these are not given in the texts. Secondly, the giving out of rewards for killing adult cheetahs and cubs was widely practised from at least 1871 onwards, but this information is mainly in the archival records. By consulting such records, it is possible to fill gaps in the chronology of extinction. The fact that government money was given out meant that

skins had to be shown as proof. Unfortunately, 'leopards and cheetahs' are often listed together. But by eliminating all such instances and selecting only figures from files where 'cheetahs' and 'leopards' are listed separately, it is possible to revise the estimated number of cheetahs killed in India. Divyabhanusinh (1995: 197-205) gives us a total of 127 cheetahs that were captured, killed, painted or photographed between 1800-1950. This thoroughly researched list does not include those killed for rewards. The total as shown in Tables 1 and 2 comes to not less than 70 cheetahs in addition to his figure. It is possible

TABLE I
ARCHIVAL RECORDS OF KILLING OF CHEETAH FOR REWARDS

Date	Location	Remarks	Source
Oct. 1872 to Sept. 1873	North West Provinces; Mirzapur district only	8 'Chitas; killed for reward Rs. 37-8 annas 4 'tendua' (leopad) also listed separately	NAI, H(P) Jan. 1875, A, 286-311, No. 296: HJA Sparks, Offg. Under Secy., Oudh, 20 Dec. 1873.
1874	Tirunelveli Dist., Madras Presidency	16 cheetahs killed for rewards of Rs. 287, rate of Rs. 18 each, thrice the NWPs rate. Leopard and cheetah are listed separately.	H (P), May 1877, A, 60-85, No. 60, CA Galton, Secy. No. 20 Dec. 1876
1875	Bellary District	5 cheetah for Rs. 61; rate Rs. 12 each; 17 leopards too.	H (P), Dec. 1877 A, 269-92, No. 269, CG Master 21 Sep. 1877.
1875	Tirunelveli	16 cheetahs killed; leopards are listed separately.	As above
1876	Madras Presidency	135 cheetah and 507 leopards killed. The former figure is suspect except for 8 in Bellary where leopards given separately. Tirunelveli (11). North Arcot (40) - but leopards are not listed separately. The former figure is close to the 1876 one. The total may be taken as 19; Coimbatore (21) but has no listing of leopards at all.	H (P), Dec. 1878, A, Nos. 249-80, No. 286: Board of Revenue Proceedings, 2 Aug. 1878.
1901	Madura, South Canara	1 killed for reward; 3 more for Rs. 50 reward.	H (P) Sep. 1902, A, No. 281-99, No. 281, pp. 6-7 L. Davidson, Secy., Board of Revenue, 13 March 1902.
1889	North Arcot	2 cheetah cubs for a total Rs. 25 bounty.	H (P) Dec. 1890, A, Nos. 360-407, no. 363, p. 32: H L. Davidson, Collector North Arcot to Secy Board, May 1890.
1903	Madura Tirunelveli	3 cheetah, no reward paid: 1 killed, skin taken as trophy.	H (P) Oct. 1903 A Nos. 237-55 no. 237, p.: Resn., Rev. Dept., 10 Mar. 1903.
1901	S. Canara	3 killed, listed in 1903 file.	As Above, p. 10.
1903	S. Canara	3 cheetah, no reward paid.	H (P) Dec. 1904, A 50-66 No. 50, Rev. Dept Madras, Procs.: 25 Mar. 1904.

TABLE 2
FURTHER RECORDS OF CHEETAH

Date	Place/Location	Remarks	Source
1892	Akoka district, Berar, near Ajanta Ghats.	Lived, bred, preyed on antelope and gazelle, trapped by villagers and up-country rajas.	King Martin, 1935: 83-84.
Early 20th century	Nandikottur, Kurnool District.	Cubs captured; Pair of adults known to Chita Pardhis, a tribe of specialist hunters.	Mankadan (1988: 18-20).
1898	Moyar-Bhavani rivers junction, west of Satyamangalam, Coimbatore district. Bhavani taluqa cheetah and tiger reported.	1 cheetah shot, 5 killed for rewards. Then the area had wolf, nilgai, bustard, florican, black buck antelope.	Nicholson, 1887: Vol II, p. 12.
1916	Nagpur, Yeotmal Districts, CPs & Berar.	Permission to trap cheetah for Nizam, Hyderabad. the file is missing in the National Archives of India.	India Office Agri. Library and Records, : Forests, P/9912, June 1916, B, 12.
1920s	Central Provinces.	Princes try trapping but fail.	JP Hewitt, 1938: 9.
1927	Kopbal, Hyderabad.	Trappers sent by Raja of Kolhapur.	HY Ghorpade 1952: 103-9.
1904	Sihawa, Raipur Dist. CPs.	2 cheetahs shot.	AG Nelson, 1909: 25
1910	Ghatbori and Hiwarched forests dist. Berar.	Recorded as present, none killed; 'only a few' in Ajanta hills.	AG Nelson, 1910: 16-17.
1910	Drug Dist, CPs.	Uncommon.	AD Lowrie, 1910: 24-28.
1914	Ranipur, Betul, CPs.	Heard of at camp, not seen.	King Martin, 1935: 194.

the actual figure was higher.

It is not easy to estimate how killing for rewards might have affected the wild population. Unlike in case of mature animals captured for

coursing, the specimens killed for rewards included cheetah cubs. For instance, in Sindh, Rs. 6 were given for a cub as against Rs. 12 for an adult (National Archives of India, Home

(Public), September, 1871, A, 43-72, pp. 6,9: Circular to local govt., 29 January 1870). Secondly, the substantial rewards may have induced tribals or caste Hindu peasants with knowledge of the habits and the habitat of the cheetah to exert fresh pressures on it. Third, the rewards almost all refer to British India. There were exceptions, with bounties being given in 1842 for both cheetahs and leopards in parts of Kathiawar. (Le Grand Jacob, 1843: 57, 37-38). This may, in general, explain why the species survived longer in some princely states in central India and the Deccan than in most of British India. Fourth, given the increasing rarity of the cheetah in India by 1900, it is possible that bounty-hunting added to other pressures such as the decline of the prey base, conversion of open scrub or grassland to permanent cultivation or shooting. The extent of killing for rewards was obviously high. Fresh work is required to ascertain how far it hastened the extinction of the cheetah in India. The average number killed for rewards in the period 1870-1925 is more than 1.2 per year. By contrast, in the entire period 1800-1950, a total of 127 (a statistical average of less than one a year) were shot, speared or trapped. This might suggest that bounty-hunting led to a higher rate of killing of cheetah in the last quarter of the 19th century.

In Divyabhanusinh's chart, as many as 62 were shot or captured in the same period: about half in the entire 150 year period. If the numbers shot or caught for sport and those eliminated for reward are totalled, (75+62=137), the average comes to over 2.49 animals a year in 1870-1925. This complements the view that this period saw a sharp decline in numbers, but it adds a new qualitative factor that may have exerted even more of an adverse impact than sport-hunting.

The mere killing of adult or juvenile animals or even of cubs is in itself no indicator of the human impact on predator populations.

Given an adequate prey base and sufficient living space, there is no reason a carnivore should vanish or even decline due to trapping, either live or dead, or because of sport-hunting. But there is little doubt, if the recorded number of sightings of cheetahs in the wild is any indicator, that it was never an abundant species in India, or at least, this was not the case by the late nineteenth century. Bounty-hunting, therefore, may have hastened, if not caused, its decline in many localities where it still survived. Given the relatively low density at which it existed, even the removal of a small number of animals could have had an adverse impact on the ability of wild populations to reproduce even at the minimal level essential for survival. In Mirzapur district in the North-West Provinces, eight cheetahs were killed by bounty-hunters for rewards in 1872-73 (NAI, H (P), Jan. 1875, A, nos. 286-296, no. 296, no pagination). Then, between 1894 and 1919, 5 were shot or killed (Allen, 1920:1041). Even this level of pressure helped exterminate the cheetah in the district. There are records of cheetah in Mirzapur after the mid-1920s. This one case illustrates how the process of extermination may have occurred at the local level.

But the habitat of the cheetah was not confined to the grass-covered plains of north India, the semi-arid tracts of Rajasthan and Gujarat or to the low, rocky outcrops of the central Indian highlands. Archival evidence and hunting records both point to its range having been much further south. The District Manual of Coimbatore district in Madras Presidency is especially valuable. It records how five cheetah skins, as distinct from panther skins, were stored in the government office. The Manual also describes the forests of the Satyamangalam forest division and the Bhavani taluka. The vegetation of northern Coimbatore in 1887 was not unlike the thorn forests of the Deccan; it still had over 300 blackbuck, wolf, bustard, florican and even a few nilgai. The distribution of the cheetah on both

sides of the river Bhavani was 'sparse' but there is no doubt that the species had been present in the recent past (Nicholson 1887, vol. II: 12).

The archival evidence on the killing of cheetah for bounties is backed by references in printed records such as district manuals, gazetteers and memoirs. But the former are far more detailed on the number of animals killed, the amount of rewards paid and the year in which bounties were given. What is crucial is that administrative policy played a major role in its extermination in British India. Much more work is required on the princely states to establish if this was, or was not, the case in these territories. But the level of the 'drain' on wild cheetah populations was substantially higher than has

been supposed. Further, the species often disappeared before its prey base declined or its habitat was taken over for cultivation. It is, of course, possible, that bounty-killing exacted a heavier toll because of a relative decline, if not extinction, of wild prey species like the blackbuck. But the tracks on the trail do point to a larger role for direct extermination as opposed to indirect causes for the decline and eventual extinction of the cheetah in India.

In all there are 9 more instances of cheetahs seen or shot.

January 12, 1998 MAHESH RANGARAJAN
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4. ANTI-PREDATORY RESPONSE OF THE INDIAN GIANT SQUIRREL *RATUFA INDICA* TO PREDATION ATTEMPTS BY THE CRESTED HAWK EAGLE *SPIZAETUS CIRRHATUS LIMNAETUS*

Since most mammalian carnivores are nocturnal, birds of prey are likely to be the most important predators of diurnally active squirrels (Emmons 1980, Hall 1981). Most studies on temperate and tropical squirrel species have

documented the importance of diurnally active raptors as predators over mammalian ones (Emmons 1980, Hall 1981, Borges 1993, Joshua 1992).

Ramachandran (1991), Joshua (1992),